Department of Economics

School of Economics & Management

Lund University

Fundamental value in stock prices

- value drivers in the Telecommunication sector

Master's Thesis

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Author:

Erik Björkegren

Tutor:

Ph. D, Erik Norrman

Content

Abstract

The valuation of assets and the value of investments has been a frequently discussed phenomenon in the academia over the years. Discussions have concerned the game of chance, behavior of investors and computer traded automatic algorithms. Despite these hypotheses investing gurus as Warren Buffet basically try to find undervalued stocks where the fundamental value exceeds the market value of the stock why assessing the fundamental value of the company is vital.

The European telecommunication sector index rose and significantly exceeded the general index in year 2000 to 2002 indicating an overvaluation or “bubble”. Does this denote that telecommunication companies cannot be valued by its fundamental value? Or how much of the value can actually be explained by the fundamental performance of the company?

The main objective of this thesis is to analyze if and how much of stock market price in the telecommunications sector that can be explained by fundamental values. Analysis is performed on the European market with data from Q1 2000 to Q2 2010.

Six value drivers affecting share value was analyzed; sales growth rate, operating profit margin, income tax rate, working capital investments, fixed capital investments and cost of capital. When fitting the change in value drivers to stock price by ordinary least squares a majority of the parameters ended up insignificant.

Two major reasons of this result have been identified; the model is insufficient in identifying fundamental value or the fundamental value can only explain a minor part of the fluctuations in stock prices. The model could be enhanced by including sector specific value drivers in the analysis or by using a more advanced estimation model. Assuming the estimation performed in this thesis is sufficient approximately 23% of the stock market fluctuations are explained by fundamental value. Furthermore, the most significant value drivers are cost of capital and income tax rate.

Keywords: *Fundamental analysis, intrinsic value, value drivers, telecommunications*

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1 Introduction

1.1 Background

The valuation of assets and the value of investments has been a frequently discussed phenomenon in the academia over the years. Historically the stock valuation has its roots in the literature of Williams from 1938 where he argues for the efficient markets view and the change in stock prices is a response to changes in the expected present value of future cash flows[1]. In 1936 Keynes presented his view by explaining investments is no more than a game of chance and whereby investors are anticipating average expectations[2].

Over the years other models have been created for the purpose of explaining fluctuations in the stock market where irrational traders and overconfidence of investors are some elements that have been used.[3,4] These methods are based merely on the investor's actions not being rational from a efficient market point of view. This focus on behavioral finance also implies that the fundamental values and performance of the underlying company becomes less important for stock valuation.

Adding to this the stock markets have become more complex and computer automated algorithms execute a large part of trading activity, which have been created trying to take advantage of high frequency trading.[5] This has implied that minor differences in input data may have fatal consequences.[6] Still, several investors disregard this financial phenomenon and focus on finding undervalued stocks (fundamental value exceeds the market value of the stock). This is a frequently used method among investing gurus as Warren Buffet why estimating the fundamental value of a company is vital.[7]

[1] Williams (1938)
[2] Keynes (1936)
[3] Cutler et al (1990)
[4] Daniel et al (1998)
[5] The Economist (2006-02-02)
[6] The Economist (2007-03-08)
[7] Hagstrom Robert G. (2005)

The fall of STOXX Europe 600 Telecommunications in year 2000 to 2002, see figure 1, indicates an overvaluation or “bubble” in the telecommunications sector. Since the fluctuations in this index is not explained by change in fundamental values this indicates other methods or algorithms for valuation has been used. Does this denote that telecommunication companies cannot be valued by its fundamental value? Or how much of the value can actually be explained by the fundamental performance of the company?

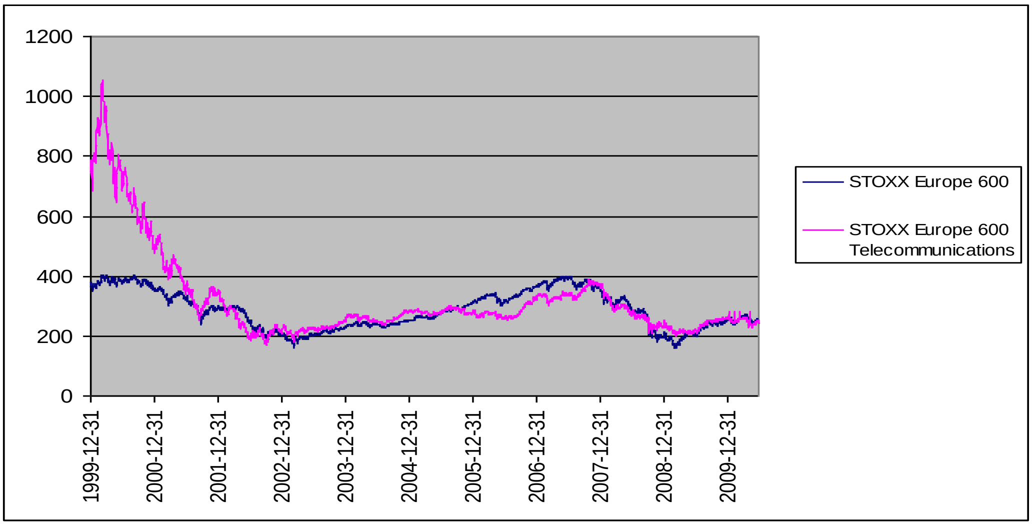

Figure 1. *The valuation of telecommunication stocks in 2000-2010.*

1.2 Purpose

The main objective of this thesis is to analyze if and how much of stock market price in the telecommunications sector that can be explained by fundamental values. First the underlying value drivers will be presented. Second, the change in these value drivers over time and the effect on stock price will be analyzed. At last a discussion will be held regarding what proportion of the stock price fluctuation that can be explained by fundamental value drivers.

1.3 Delimitations

To reduce noise from differences in macro- and microeconomic environments influencing stock price around the globe this thesis will focus solely on the European market.[8] Due to insufficient data, a range from Q1 2000 to Q2 2010 will be analyzed.

This study focus on the financial value drivers in a company, hence not taking into account management or competitive advantages etcetera when estimating fundamental value.

[8] Chua C. et al. (2007)

2 Fundamental value drivers in a business

2.1 Stock price and fundamental value

The stock price is the current market price of the company, for publicly traded companies this is easily observed. In contrast to the price offered in the market, fundamental value (also called intrinsic value) represents the “true” value of the company’s stock. The relationship between the stock price and intrinsic value is illustrated in figure 2 below.[9]

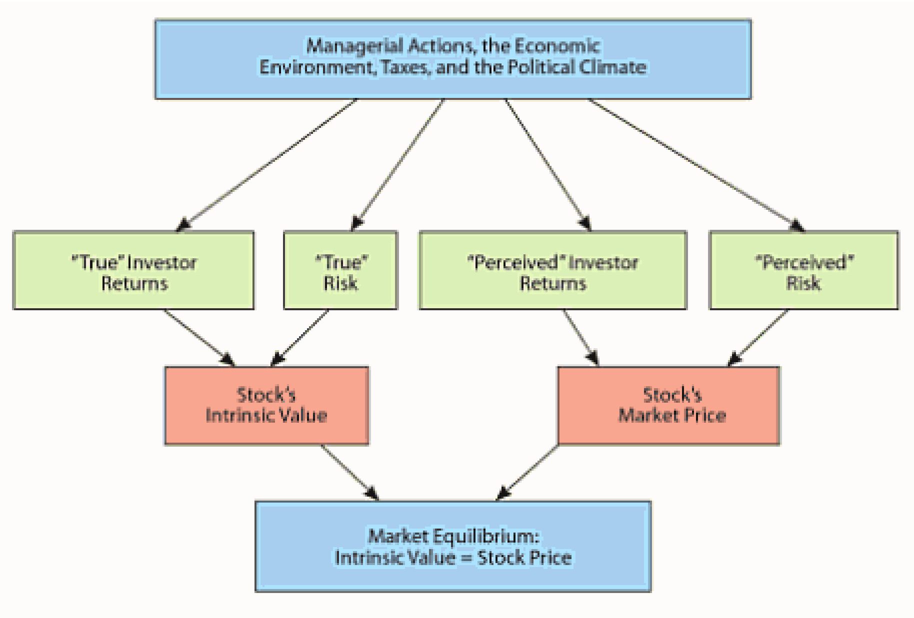

Figure 2. *Stock market price vs. intrinsic value*

Market equilibrium occurs when the intrinsic value equals the market price and if the market is reasonably efficient gaps should not be very large, or exist for very long. Despite this the value gap between intrinsic value and stock price may be large for limited periods and individual stocks. For instance, prior to the credit crunch in 2007-2008 several of the investment banks where priced much higher than the intrinsic value because of the lack of information about the risk it included.[10]

[9] Brigham & Houston, p.273
[10] ibid., p.274

When investors are looking for new investments they will look for stocks that are undervalued, i.e. the market price is below the intrinsic value. Therefore it is of significant interest to estimate the intrinsic value of the stock. This is also in the manager's interest since they need to be aware of how their actions will be reflected in the estimation of intrinsic value and stock price. Also, managers need to take into consideration if the stock is under- or overvalued when making decisions, for instance when issuing new shares.[11]

Estimation methods

To estimate intrinsic value two basic models are frequently used; the discount dividend model and the corporate valuation method. The discounted dividend model calculates the market stock price (*P_0*) by, as the name indicates, discounting the dividend (*D_t*) at time (*t*) by a certain discount rate (*r*, required rate by shareholders) and focus on the direct rate of return to the shareholder. See equation (1) below for the definition. For companies who do not pay dividends the corporate valuation method is applicable and calculates the value of the firm $V_{company}$ by discounting the free cash flow (*FCF_t*) at time t by the weighted average cost of capital (*WACC*), see equation (2) below.[12]

$$P_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+r)^t} \tag{1}$$

$$V_{company} = \sum_{t=1}^{\infty} \frac{FCF_t}{(1+WACC)^t} \tag{2}$$

Efficient market hypothesis

To reach market equilibrium, i.e. intrinsic value equals market value, the assumption of efficient markets need to prevail. The definition of efficient market is if it fully and correctly reflects all relevant information for the pricing of stocks. Hence, if the stock price is

[11] ibid., p.274
[12] ibid., pp.274

unaffected when certain information is revealed to all participants this implicates market efficiency. This also implies that it is impossible to make economic profits by trading in accordance to the information.[13]

Over the years the efficient market hypothesis has been questioned by several financial economists including Nicholson (1968), Basu (1977) and Rosenberg et al. (1985). Investor behavior implies imperfections in financial markets because of overconfidence, overreaction and various other human errors in reasoning. This may for instance lead to investors buying growth stocks for expensive prices instead of focusing on value stocks.[14]

2.2 Business value drivers

During the 1990s shareholder value applications in businesses was based on capital expenditures and pricing acquisitions with discounted cash-flow models. Nowadays companies have changed focus towards incorporating shareholder value into management planning and performance evaluation. Despite this change the fundamental shareholder value model continues to reflect the fundamental market-based value on assessing the value of an asset – the cash it is expected to generate discounted by the cost of capital and adjusted for the risk.[15]

Estimating shareholder value

The total value of a business is the total sum of its equity and its debt; this is also referred to as “corporate value”. The corporate value is composed by the shareholder value (equity) and the market value of debt.

Shareholder value is affected by seven value drivers – sales growth rate, operating profit margin, income tax rate, working capital investments, fixed capital investments, cost of capital and value growth duration. The value drivers have an effect on the three value components cash flow from operations, discount rate and debt which form the shareholder

[13] Malkiel (1989)
[14] Cunningham (2002)
[15] Rappaport (1998), p. xiii

value. To fulfill the corporate objective of maximized shareholder value added managers have to make efficient operational, investment and financing decisions that affect each and every value driver, see figure 3.[16]

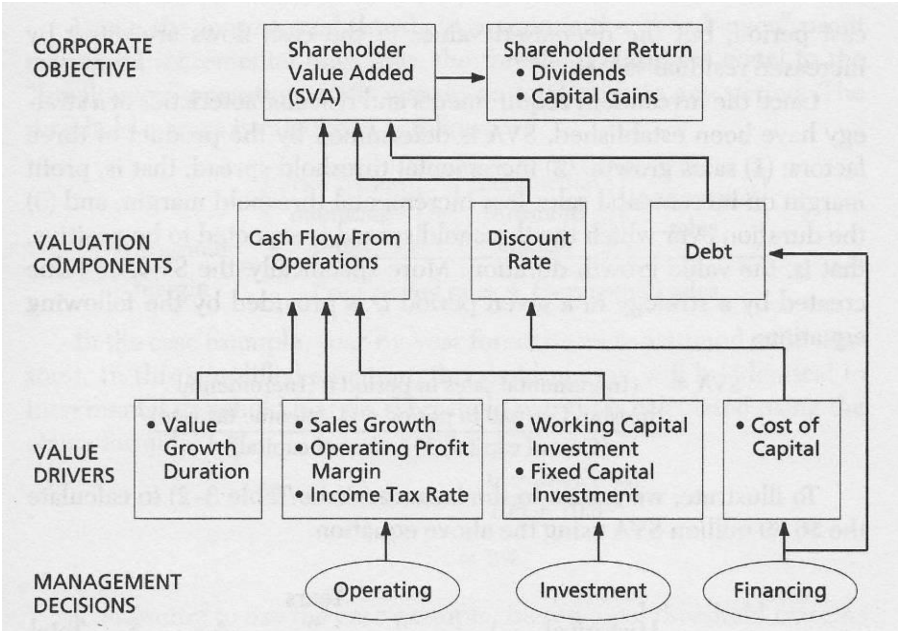

Figure 3. *The Shareholder Value Network*

Cash flow from operations represents the cash available to compensate share- and debtholders. When measuring cash flow from operations a certain value growth period is being used, this is referred to as value growth duration. Revenue increase by the sales growth but the cash flow generated by the company depends on the efficiency in operations, the operating profit margin, and furthermore the income tax rate. From cash flow generated in operations investments usually have to be made for liquidity, maintenance or expansion. These investments are either in working capital (operating liquidity) or fixed capital (fixed assets). The investment will penalize present cash flow but are necessary to generate future cash flow for the business.[17]

The value drivers in operations generate cash flow in present or future time. To convert all these flows to present time the discount rate need to be estimated. The appropriate rate for

[16] ibid, pp. 32
[17] ibid., pp. 33

a company is the weighted average cost of debt (after tax) and equity capital. The cost of capital is used as the hurdle rate for the management when taking decisions on new investments. Cost of capital is compounded by the returns demanded by both share- and debtholders, which are estimated by a risk free rate plus a risk premium depending on the extra risk the investor has to take on in comparison to equal investments. The cost of capital is minimized by making efficient financing decisions for the business.[18]

Estimating the change in shareholder value over a limited time frame is a measurement of management performance over the specific period, this is also called shareholder value added. Value creation ultimately originates the return to shareholders.[19]

2.3 The principal-agent problem

The market economy is based on individuals making transactions to achieve an optimal allocation of resources. In cases where principals (e.g. shareholders) have imperfect control of their agents (e.g. managers), transactions made by the agent may not be in the best interest of their principal. The agents may have their own interests which may not perfectly correlate with the principals. There are, however, a few reasons for the manager to act according to the shareholder's interest if decreased shareholder value affects the manager's personal wealth and/or risk of replacement. To avoid the agent problem the company should make sure the incentives are high to act in favor for the shareholder.[20]

2.4 Multiple linear regression

A regression is an approach to model the relationship between a dependent variable Y and one or more independent variables X. In linear regression the unknown parameters are estimated by using linear functions. When more than one independent variable is used this is called multiple linear regression. See equation (3) below where *y* is the dependent

[18] ibid., pp. 37
[19] ibid., p. 49
[20] ibid., pp. 3

variable, $x_1,\ldots, x_K$ are the independent variables, $\beta_1, \ldots, \beta_K$ are the coefficients and ε is the error term.[21]

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_K x_K + \varepsilon \tag{3}$$

The common estimating technique for linear regression is the method of ordinary least squares. The technique is based on minimizing the sum of squared residuals and is defined as equation (4) below where b is the matrix of the estimated coefficients of β, X is the matrix of the independent variables x and y are the dependent variables.[22]

$$b = \left(X'X\right)^{-1} X'y \tag{4}$$

For the OLS to hold and to be able to perform t and F tests several assumptions have to hold, presented below:[23]

1. The model specifies a linear relationship between the independent variables $x_1,\ldots, x_K$ and y.
2. The independent variables $x_1,\ldots, x_K$ must linearly independent.
3. The expected value of error terms ε should always be zero.
4. No autocorrelation in error terms ε, i.e. the errors must be uncorrelated between observations.
5. The error terms ε must be homoscedastic, i.e. all errors must have the same variance.
6. The process generating the data operates independently of the process that generates the error terms ε.
7. The error terms ε are normally distributed.

[21] Greene (2002), pp. 1
[22] ibid, pp. 19
[23] ibid, p. 10

3 Analysis of fundamental value drivers in telecommunications

3.1 Introduction

Fundamental value drivers in stock performance have been immensely discussed among the academic society. Lawrence (1985), Gentry et al. (2004) and Jirasakuldech et al. (2007) have argued how the speculative investor may affect stock price, making fundamental value drivers less or non significant. They also discuss the difficulty in assessing the fundamental value of a company, since investors seek to estimate future cash flows in combination with an appropriate risk adjusted discount rate.

This analysis will only take into account company specific financial value drivers. The effect of the drivers will be estimated at a specific time in history which will indicate on the direct effect in changes of that specific driver.

Despite several general studies analyzing value drivers in businesses have been carried out no known study today has analyzed how the firm specific value drivers reflect the stock performance in the telecommunications sector.

3.2 Data set

The companies used in this analysis are telecommunication companies in Europe contained in the STOXX Europe 600 Telecommunications index. This index is derived from STOXX Europe 600, an index comprised by 600 of the largest stocks by free float market capitalization. The Telecommunications supersector index is used as a benchmark for the telecommunications sector in Europe and contains the largest companies in this sector.[24] Among the 20 companies eleven had sufficient quarterly financial data for the period Q1 2000 to Q2 2010 to complete this analysis, see table 1 for information about the companies included in this study. All data for this study has been acquired from Thomson Reuters Datastream 5.0 and Reuters 3000 Xtra 5.0.1101.

[24] STOXX Europe 600 Telecommunications Index

Company	Country
BT Group plc	Great Britain
Deutsche Telekom AG	Germany
Elisa Corporation	Finland
Hellenic Telecommunications Organization S.A. (OTE)	Greece
Koninklijke KPN NV	Netherlands
Portugal Telekom SGPS SA	Portugal
Swisscom AG	Switzerland
Tele2 AB	Sweden
Telefonica S.A.	Spain
Telekom Austria AG	Austria
Telenor ASA	Norway

Table 1. *Companies included in the study*

3.3 Model parameters

When performing this analysis the financial parameter from Rappaport's theory of value drivers for creating shareholder value has been used. In this section calculations for the seven value drivers will be explained. Due to insufficient data some of the original equations below have been modified to fit the data set of this study. Changes in these values will have an effect on the estimation methods presented in section 2.1, hence change the fundamental value.

Sales growth rate

The sales growth rate represents the increase in sales, in percent, for a specific period. In the data set sales is represented by revenue and the sales growth at time *t* is calculated as equation (5) below.[25]

$$SG(\%) = \frac{revenue_t}{revenue_{t-1}} - 1 \qquad (5)$$

Operating profit margin

The operating profit margin is the ratio of pre-interest, pretax operating profit to sales (in this case revenue) calculated as equation (6) below.[26]

$$OPM\ (\%) = \frac{operating\_result_t}{revenue_t} \qquad (6)$$

Income tax rate

Since the income tax rate depends on deferred income taxes from timing differences, it is sufficient to use the statutory income tax rate in the country where the company is located to get a fair comparison. The statutory tax rates in this study are conducted from the OECD tax database.[27]

Working capital investments

To support sales growth, working capital investments are needed. This represents the net investment in accounts receivable, inventory, accounts payable and accruals.[28] In this study the working capital investment rate is calculated as increase in current assets less increase in current liabilities to revenue, presented in equation (7) below.[29]

[25] Rappaport (1998), p. 34
[26] ibid., p. 35
[27] OECD Tax Database
[28] ibid., p. 36
[29] Copeland (2005), p.511

$$WC(\%) = \frac{\Delta current\_assets_t - \Delta current\_liabilities_t}{revenue_t} \quad (7)$$

Fixed capital investments

Fixed capital investment is represented as investments in assets that depreciate over time, as new or replacement property, plant and equipment. This is initially recorded as a cost and included in fixed assets on the balance sheet.[30] Since capital expenditures is not found in the data set this is represented by the change in total assets less the change in total liabilities.[31] This will include the change in working capital investments but is still seen as a sufficient proxy. The fixed capital investment rate to revenue is defined as equation (8) and (9) below.

$$\Delta capital\_\exp enditures_t = \Delta total\_assets_t - \Delta total\_liabilities_t \quad (8)$$

$$FC(\%) = \frac{\Delta capital\_\exp enditures_t - depreciation\_\exp ense_t}{revenue_t} \quad (9)$$

Cost of capital

The appropriate rate to discount the future cash flows of the company is by using the weighted average cost of capital (WACC), presented in equation (10) below.[32]

$$WACC(\%) = \frac{D}{D+E} k_d (1-T) + \frac{E}{D+E} k_e \quad (10)$$

In its simplest form this is the weighted average of after-tax cost of debt (k_d) and cost of equity (k_e). To estimate the cost of equity the capital asset pricing model (CAPM) is suitable., CAPM is used to determine the expected rate of return of assets by a risk-free rate (r_f) plus the asset specific beta (β_i) times the market risk premium, see expected rate of return on asset *i* in equation (11) below.

$$E(R_i) = r_f + \beta_i \left[E(R_m) - r_f \right] \quad (11)$$

[30] Rappaport (1998), p.17
[31] Jiambalvo (2004), p. 309
[32] Goedhart (2005), p. 236

The appropriate risk-free rate to use is a long-term government rate in the same currency as cash flows. In this study domestic, where applicable long-term, government bonds have been used. The company beta has been acquired from Thomson Reuters Datastream 5.0. Market risk premium has been estimated by calculating the excess return for a domestic index, representing the expected market performance, to the domestic risk-free rate. [33]

The after-tax cost of debt is estimated by the yield to maturity for the company's long-term, option-free, bonds.[34] Some of the companies in this study have issued bonds and therefore this can be used, for the rest an estimation method has to be applied. All companies that issue debt will seek a credit rating from one of the credit rating agencies (e.g. Standard & Poors or Moodys). The credit rating asses an outlook for the default risk of the debt. For similar companies in the industry there will be a strong correlation between the credit rating and premium of debt, hence this can be used to estimate the debt premium. Table 2 below show the debt premium on US utility bonds used in this study and illustrates how the debt premium increases when the credit rating declines.[35]

Rating	10 year maturity
AAA	15
AA+	18
AA	29
AA-	43
A+	58
A	60
A-	62
BBB+	78
BBB	103
BBB-	115
BB+	275

Table 2. *Debt premium on US utility bonds (basis points)*

[33] ibid., pp. 239
[34] ibid., p. 261
[35] Frontier Economics, p. 22

Other external domestic regulatory decisions may also affect the debt premium but is excluded in this study because of the complexity and hence the contingency that arises in the output. The debt premium is estimated as the risk-free rate plus the debt premium based on US utility bonds; see credit ratings for each company in Appendix A.

Value growth duration

The value growth duration represents the number of years it takes before the present value of cash flows equals the current market value.[36] Since this study consists of a homogenous set of companies the value growth duration is assumed to be approximately equal for all companies over time, and hence not taken into account in this model.

3.4 Estimation model

The estimation model in this study is based on a multiple linear regression. The model has one dependent variable Y_i (stock price for company *i*) and six independent variables SG_i, OPM_i, etc (value of value driver in company *i*) as well as seven regression coefficients β_i and ε_i the error term for company *i*. One regression is conducted for each company stock price *i*, leaving eleven regressions. The regression model for company *i* is illustrated in equation (12) below.

$$\begin{aligned} Y_i &= \beta_0 + \beta_1 SG_{i1} + \beta_2 OPM_{i2} + \beta_3 FCAPEX_{i3} + \\ &\beta_4 WCAPEX_{i4} + \beta_5 TAX_{i5} + \beta_6 WACC_{i6} + \varepsilon_i \end{aligned} \tag{12}$$

3.5 Fitting the model on data from Q1 2000 to Q4 2006

The regression was modeled by using data from Q1 2000 to Q4 2006 and subsequently tested for the period Q1 2007 to Q2 2010 to determine the goodness of fit in the result. For

[36] Rappaport (1998), p. 105

the fitting process the statistical software EViews 7 was used and the model was estimated by ordinary least squares (OLS).

Expected value for coefficients

The value drivers are expected to affect the company and the value of the company in a certain way, hence the value and correlation of the coefficient is expected to obtain a positive or negative value. In table 3 below the expected value and explanation is presented.

<table>
<tr><th>Value driver</th><th>Expected value</th><th>Explanation</th></tr>
<tr><td>Sales growth rate</td><td>Positive</td><td>Increasing sales growth implies increasing revenues.</td></tr>
<tr><td>Operating profit margin</td><td>Positive</td><td>Increased margin implies higher efficiency in operations and a larger part of revenue is turned into operating income.</td></tr>
<tr><td>Income tax rate</td><td>Negative</td><td>Lower taxes imply a larger part of earnings before interest and taxes (EBIT) is turned into free cash flow (FCF).</td></tr>
<tr><td>Working capital investments</td><td>-</td><td rowspan="2">Capital investments penalize the present FCF for the company but are realized to increase future FCF why this investment can be either positive or negative depending on if the investment exceeds the hurdle rate (i.e. cost of capital).</td></tr>
<tr><td>Fixed capital investments</td><td>-</td></tr>
<tr><td>Cost of capital</td><td>Negative</td><td>Increase in cost of capital implicates increased cost of the company's funds. Since this is used as a discount rate in valuation models as the corporate valuation method increased cost leads to decreased present value of the company.</td></tr>
</table>

Table 3. *Expected coefficient value for value drivers.*

Significance

To determine which specific value drivers in each company that influence the stock price a significance test was performed on the 5%-level. The result is presented in table 4 below, for the complete output from the statistical analysis see Appendix B.

Company	5%-level	Comment on odd coefficients
BT Group plc	Sales growth rate Working capital investments WACC	WACC has positive coefficient.
Deutsche Telekom AG	Income tax rate WACC	Both tax and WACC has positive coefficients.
Elisa Corporation	Income tax rate WACC	WACC has positive coefficient.
Hellenic Telecommunications Organization S.A. (OTE)	Operating profit margin Income tax rate WACC	Operating profit margin has negative and WACC positive coefficient.
Koninklijke KPN NV	Income tax rate	
Portugal Telekom SGPS SA	Income tax rate WACC	WACC has positive coefficient.
Swisscom AG	WACC	WACC has positive coefficient.
Tele2 AB	WACC	
Telefonica S.A.	Operating profit margin Fixed capital investments	Operating profit margin has negative coefficient.
Telekom Austria AG	Sales growth rate Fixed capital investments Income tax rate WACC	Sales growth rate has negative and WACC positive coefficient.
Telenor ASA	WACC	

Table 4. *Significance test of value drivers (the values presented have rejected null hypothesis)*

As seen in table 4 above only a few of the value drivers are significant on the 5%-level. For nine of the companies WACC was significant but frequently with a positive coefficient, indicating that increased cost of capital is increasing the value of the company which is in conflict with the expected negative correlation. Furthermore, income tax rate is significant for six of the companies and frequently with the expected positive correlation.

The sales growth rate, operating profit margin and fixed capital investments where only significant for two companies and working capital investments for one.

3.6 Testing for autocorrelation and heteroscedasticity

A test for autocorrelation and heteroscedasticity was performed to identify possible patterns in the data that may violate the assumptions of the estimation method OLS.

Autocorrelation

Autocorrelation or serial correlation is the correlation of the residuals in its own lagged values. This induces time dependency of error terms and violates the ordinary least squares (OLS) assumption that the error terms are uncorrelated. Therefore, using the t-statistic in statistical computation cannot be trusted.[37] Autocorrelation is tested in EViews by the Breusch-Godfrey Serial Correlation Lagrange multiplier test for general, high-order, ARMA errors. The test statistic is the product of number of observations and the coefficient of determination (R^2) and is asymptotically distributed as χ^2 under the null hypothesis no autocorrelation.[38]

Heteroscedasticity

If random variables have different variances the sequence is heteroscedastic. Heteroscedasticity in a sample induces that the assumption of constant error terms for

[37] Hendry, pp. 40
[38] EViews 7 Help Topics, “Serial correlation”

Ordinary Least Squares (OLS) does not hold. This does not cause the estimated OLS coefficients to be biased but it can influence the estimated coefficient variances to be biased. Biased standard errors lead to biased inference, which can lead to misleading result from hypothesis testing.[39] In this study a test of heteroscedasticity was performed in EViews by Breusch-Pagan-Godfrey test, which tests the estimated variance of residuals from a regression that are dependent on the values of the independent variables. The test statistic is asymptotically distributed as χ^2 under the null hypothesis no heteroscedasticity.[40]

Result

When the null hypothesis is rejected this represents the hypothesis of no autocorrelation/heteroscedasticity is rejected and therefore this cannot be excluded. In this study the hypothesis test was performed at the 5%-level. A summary of the result is illustrated in table 5, below. For the complete result of the test see Appendix B.

Company	Autocorrelation	Heteroscedasticity
BT Group plc	Yes, AR(1)	No
Deutsche Telekom AG	Yes, AR(1)	No
Elisa Corporation	No	No
Hellenic Telecommunications Organization S.A. (OTE)	No	No
Koninklijke KPN NV	No	No
Portugal Telekom SGPS SA	No	No
Swisscom AG	Yes, AR(1)	Yes
Tele2 AB	Yes, AR(1)	No

[39] Hendry, pp. 45
[40] EViews 7 Help Topics, "Performing a test of heteroscedasticity in EViews"

Telefonica S.A.	Yes, AR(1)	No
Telekom Austria AG	No	No
Telenor ASA	Yes, AR(1)	No

Table 5. *Test result from autocorrelation and heteroscedasticity in the sample studied.*

3.7 Refining the model

Since the result from the regression included several insignificant variables a refining of the model was performed. This included trying to use logarithmic values for the value driver. Due to negative values in the data set this method was rejected. Furthermore, insignificant value drivers were excluded from the regression trying to enhance the significance for other parameters. This method did not give any substantial difference, hence refining of the model was unsuccessful.

3.8 Fitting the result on data from Q1 2007 to Q2 2010

A fitting was performed to determine the credibility of the model and decrease the risk of modeling a known phenomenon, since this analysis is estimated on historical data where the outcome is already known. Using the result from the regression a fitting was carried out using Microsoft Excel 2003. This test intended to analyze how good the multiple regressions are to predict the dependent variables. Using the coefficient of determination (R^2) for the parameters estimated from Q1 2000 to Q4 2006 on data for the period Q1 2007 to Q2 2010 will result in a goodness of fit. The coefficient of determination is composed by upon how much of the variance of the dependent variable (*Y,* stock price) is explained by the fluctuations of the independent variables (*X*, value drivers). A low R^2 indicates that the independent variables used are insufficient to predict the dependent variable, however they might explain minor fluctuations.

R^2 can be calculated as the square of the correlation coefficient ρ.[41] Furthermore, ρ is calculated as the covariance of the two variables (X, Y) divided by the product of the standard deviations (σ_X, σ_Y), see equation (13) below.[42]

$$\rho = \frac{\text{cov}(X,Y)}{\sigma_X \sigma_Y} \qquad \textbf{(13)}$$

The result from this test is presented in table 6 below.

Company	R^2
BT Group plc	0.4846
Deutsche Telekom AG	0.3685
Elisa Corporation	0.0262
Hellenic Telecommunications Organization S.A. (OTE)	0.4088
Koninklijke KPN NV	0.2675
Portugal Telekom SGPS SA	0.0439
Swisscom AG	0.0098
Tele2 AB	0.6866
Telefonica S.A.	0.0562
Telekom Austria AG	0.1764
Telenor ASA	0.0101
Industry mean	***0.2308***

Table 6. *Coefficient of determination for estimated models*

[41] Mendenhall et al., p. 518
[42] Hensher et al. p. 34

4 Discussion and conclusion

Since the estimated model in this thesis contains a majority of insignificant variables and several odd coefficients the credibility in the result can be questioned. Two major reasons of this result have been identified; the model is insufficient in explaining fundamental value or the fundamental value can only explain a minor part o f the fluctuations in stock prices.

Assuming the model is insufficient one can argue why this is the case. First of all the input data for this study is quarterly data from the consolidated statement of income and the balance sheet, hence few data points may affect significance. Since a regression is performed on quarterly stock data (last day each quarter) daily deviations may distort the result, at the same time may lags in information flow have the same effect. Furthermore, the value drivers used in this study may not be applicable to the telecommunications sector. Sector specific value drivers may be more significant for the stock value than the ones Rappaport is suggesting, for instance churn rate or average revenue per user (ARPU) may better explain company performance.

Assuming the model is sufficient and is fair in explaining the value driver’s contribution on stock price performance. This indicates that the company’s performance measured in fundamental value drivers is a minor fraction of the value of companies in telecommunications. According to this study approximately 23% (0.2308) of the stock market fluctuations are explained by the fundamental value but differences between companies are large. Furthermore, this denotes that other factors as expectations and investor behavior are more important to consider when maximizing shareholder value and stock price. This is very important to take under consideration when making decisions among managers, shareholders and investors.

If sufficient, a conclusion can be drawn that the most significant value drivers in the telecommunications sector is the cost of capital and the income tax rate. The cost of capital was significant for nine of the eleven companies, while the income tax rate was significant for six companies.

Regarding the principal-agent problem this may affect the fundamental value of the companies in this study. If managers make decisions in favor for themselves instead of the shareholder this may decrease the return of the company and consequently the fundamental value. This implies that shareholder expectations are not fulfilled and the fundamental value to stock price will decrease leaving a larger value gap and less explanatory variables.

5 Future research studies

Since it is difficult to draw any distinct conclusions from this study further research is necessary to be able to conclude how fundamental value drivers influence stock price in the telecommunications sector.

First of all it would be interesting to improve the model by testing specific value drivers for the telecommunications sector. This includes adding churn rate and ARPU as independent variables in the estimation model.

Since several of the coefficients in the estimated models had odd signs introducing constraints may help to fit a more significant model.

Autocorrelation and heteroscedasticity could not be excluded from some of the estimations why more advanced models may improve the estimation. Methods that could be useful include generalized least squares (GLS), Newey-West HAC estimator and weighted least squares.

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Appendix A Information about companies in the study

The information in this appendix is conducted from Thomson Reuters Datastream 5.0 and Reuters 3000 Xtra 5.0.1101. See table A.1 below for information about the companies included in this study.

Company	Country	RIC	Credit Rating (S&P)[43]
BT Group plc	Great Britain	BT.L	BBB-
Deutsche Telekom AG	Germany	DTEGn.DE	BBB+
Elisa Corporation	Finland	ELI1V.HE	BBB
Hellenic Telecommunications Organization S.A. (OTE)	Greece	OTEr.AT	BBB-
Koninklijke KPN NV	Netherlands	KPN.AS	BBB+
Portugal Telekom SGPS SA	Portugal	PTC.LS	BBB
Swisscom AG	Switzerland	SCMN.VX	A
Tele2 AB	Sweden	TEL2b.ST	
Telefonica S.A.	Spain	TEF.MC	A-
Telekom Austria AG	Austria	TELA.VI	BBB
Telenor ASA	Norway	TEL.OL	A-

Table A.1. *Information about companies included in this study*

[43] Foreign Long Term, 2010-12-13

Appendix B Result from regression analysis

In this appendix the complete result from the regression analysis is presented. First a table with the estimated coefficients and other substantial statistics are presented including test of autocorrelation and heteroscedasticity, thereafter follows an illustration with the actual stock prices (Actual) compared to the fitted model (Fitted) and residual (Residual). For an explanation of abbreviations see table B.1 below and equations can be found in section 3.3 Model parameters.

For some of the companies the value driver income tax rate was unchanged over the whole period and therefore disregarded from the model.

Abbreviation	Explanation
SG	Sales Growth Rate
OPM	Operating Profit Margin
FCAPEX	Fixed Capital Investment Rate
WCAPEX	Working Capital Investment Rate
TAX	Income Tax Rate
WACC	Weighted Average Cost of Capital

Table B.1. *Explanations of abbreviations in Appendix B.*

BT Group plc

Dependent Variable: STOCK
Method: Least Squares
Date: 12/15/10 Time: 10:45
Sample: 2000Q1 2006Q4
Included observations: 28
STOCK = C(1) + C(2)*SG + C(3)*OPM + C(4)*FCAPEX + C(5)*WCAPEX + C(7)*WACC

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-1457.311	315.3844	-4.620747	0.0001
C(2)	394.9881	166.3187	2.374887	0.0267
C(3)	253.3974	174.7308	1.450216	0.1611
C(4)	4.254176	30.91569	0.137606	0.8918
C(5)	-114.2586	48.23575	-2.368753	0.0270
C(7)	40723.04	7373.319	5.523027	0.0000

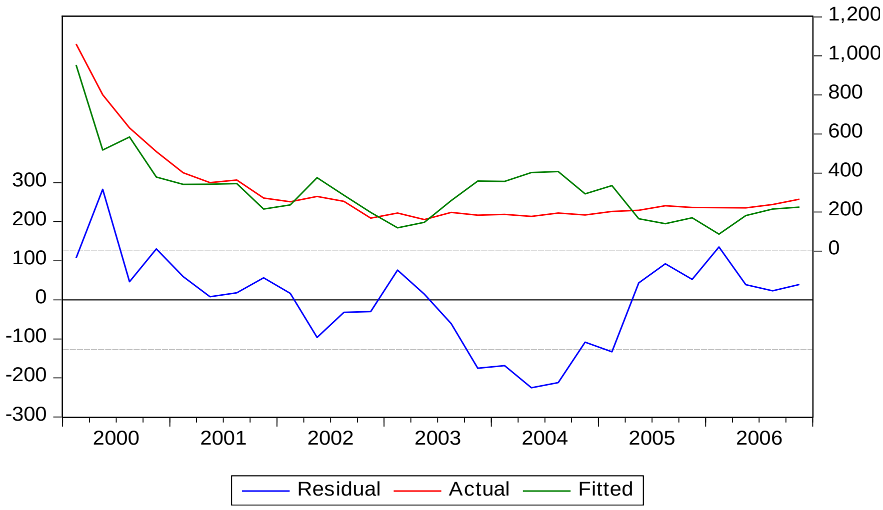
R-squared	0.694206	Mean dependent var	308.8450
Adjusted R-squared	0.624707	S.D. dependent var	208.2749
S.E. of regression	127.5916	Akaike info criterion	12.72295
Sum squared resid	358151.3	Schwarz criterion	13.00843
Log likelihood	-172.1214	Hannan-Quinn criter.	12.81023
F-statistic	9.988776	Durbin-Watson stat	0.620392
Prob(F-statistic)	0.000043		

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	9.102260	Prob. F(2,20)	0.0015
Obs*R-squared	13.34205	Prob. Chi-Square(2)	0.0013

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.442213	Prob. F(5,16)	0.8126
Obs*R-squared	2.671091	Prob. Chi-Square(5)	0.7505
Scaled explained SS	0.779817	Prob. Chi-Square(5)	0.9783



Deutsche Telekom AG

Dependent Variable: STOCK
Method: Least Squares
Date: 12/15/10 Time: 11:51
Sample: 2000Q1 2006Q4
Included observations: 26
STOCK = C(1) + C(2)*SG + C(3)*OPM + C(4)*FCAPEX + C(5)*WCAPEX + C(6)*TAX + C(7)*WACC

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-322.1365	47.44962	-6.789022	0.0000
C(2)	-0.812160	12.07407	-0.067265	0.9471
C(3)	12.18694	8.380195	1.454255	0.1622
C(4)	-2.642928	3.542688	-0.746023	0.4648
C(5)	-1.135170	0.731820	-1.551160	0.1374
C(6)	750.6995	133.8099	5.610194	0.0000
C(7)	1309.417	436.9133	2.996972	0.0074

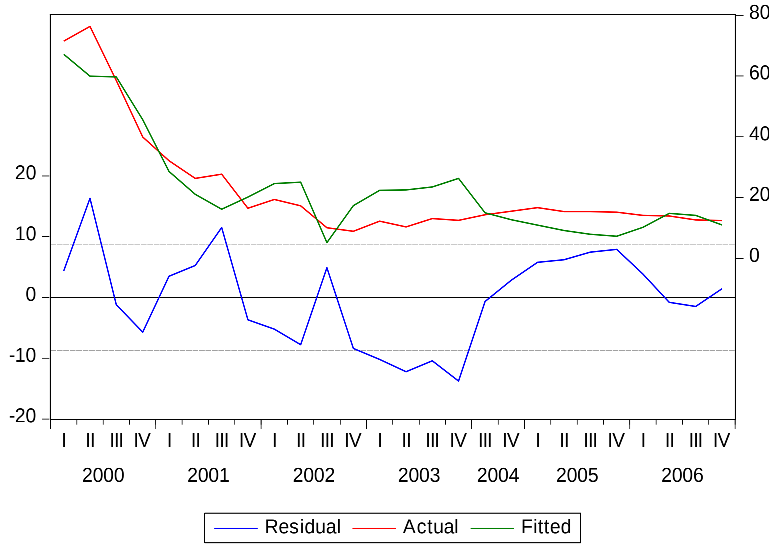
R-squared	0.829137	Mean dependent var	23.00846
Adjusted R-squared	0.775181	S.D. dependent var	18.46292
S.E. of regression	8.754212	Akaike info criterion	7.401751
Sum squared resid	1456.088	Schwarz criterion	7.740469
Log likelihood	-89.22276	Hannan-Quinn criter.	7.499290
F-statistic	15.36675	Durbin-Watson stat	0.903584
Prob(F-statistic)	0.000002		

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.954530	Prob. F(2,17)	0.0389
Obs*R-squared	8.255452	Prob. Chi-Square(2)	0.0161

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.897931	Prob. F(6,19)	0.1336
Obs*R-squared	9.743361	Prob. Chi-Square(6)	0.1359
Scaled explained SS	3.505085	Prob. Chi-Square(6)	0.7433



Elisa Corporation

Dependent Variable: STOCK
Method: Least Squares
Date: 12/15/10 Time: 11:52
Sample (adjusted): 2000Q2 2006Q4
Included observations: 27 after adjustments
STOCK = C(1) + C(2)*SG + C(3)*OPM + C(4)*FCAPEX + C(5)*WCAPEX + C(6)*TAX + C(7)*WACC

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	62.36374	16.03682	3.888784	0.0009
C(2)	0.942550	10.99392	0.085734	0.9325
C(3)	9.854321	6.309124	1.561916	0.1340
C(4)	0.939766	2.735637	0.343527	0.7348
C(5)	-1.069668	2.627985	-0.407030	0.6883
C(6)	-307.8099	71.00382	-4.335118	0.0003
C(7)	972.4718	165.7630	5.866639	0.0000

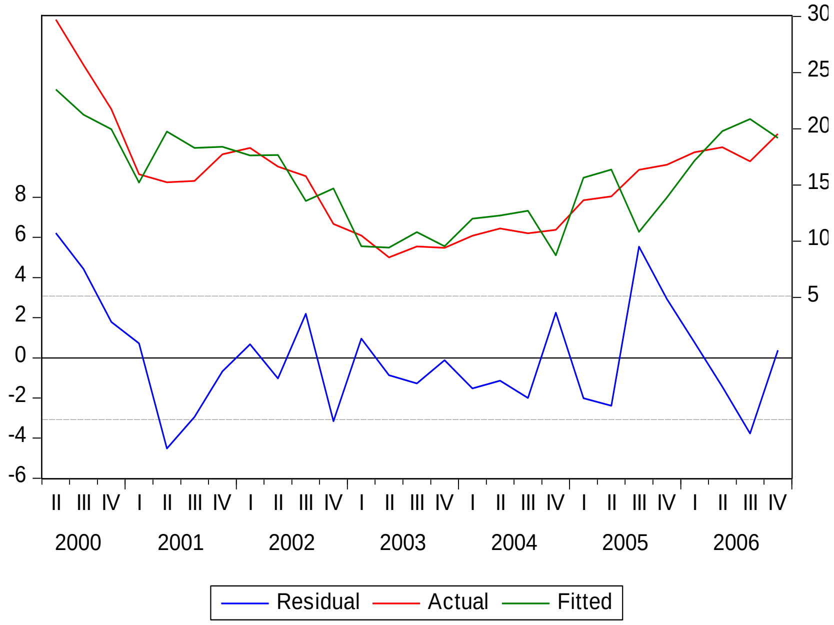
R-squared	0.707890	Mean dependent var	15.50815
Adjusted R-squared	0.620257	S.D. dependent var	4.996924
S.E. of regression	3.079268	Akaike info criterion	5.305675
Sum squared resid	189.6378	Schwarz criterion	5.641632
Log likelihood	-64.62661	Hannan-Quinn criter.	5.405573
F-statistic	8.077899	Durbin-Watson stat	1.332434
Prob(F-statistic)	0.000161		

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.719865	Prob. F(2,18)	0.5003
Obs*R-squared	1.999653	Prob. Chi-Square(2)	0.3679

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.389219	Prob. F(6,20)	0.2670
Obs*R-squared	7.942508	Prob. Chi-Square(6)	0.2423
Scaled explained SS	4.079181	Prob. Chi-Square(6)	0.6660



Hellenic Telecommunications Organization S.A. (OTE)

Dependent Variable: STOCK
Method: Least Squares
Date: 12/15/10 Time: 11:52
Sample: 2000Q1 2006Q4
Included observations: 28
STOCK = C(1) + C(2)*SG + C(3)*OPM + C(4)*FCAPEX + C(5)*WCAPEX + C(6)*TAX + C(7)*WACC

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	27.28848	7.274333	3.751338	0.0012
C(2)	13.92464	11.39533	1.221960	0.2353
C(3)	-14.99694	4.557241	-3.290793	0.0035
C(4)	3.745053	2.782011	1.346168	0.1926
C(5)	0.220130	1.142509	0.192672	0.8491
C(6)	-143.1221	23.94701	-5.976619	0.0000
C(7)	950.0152	98.42287	9.652383	0.0000

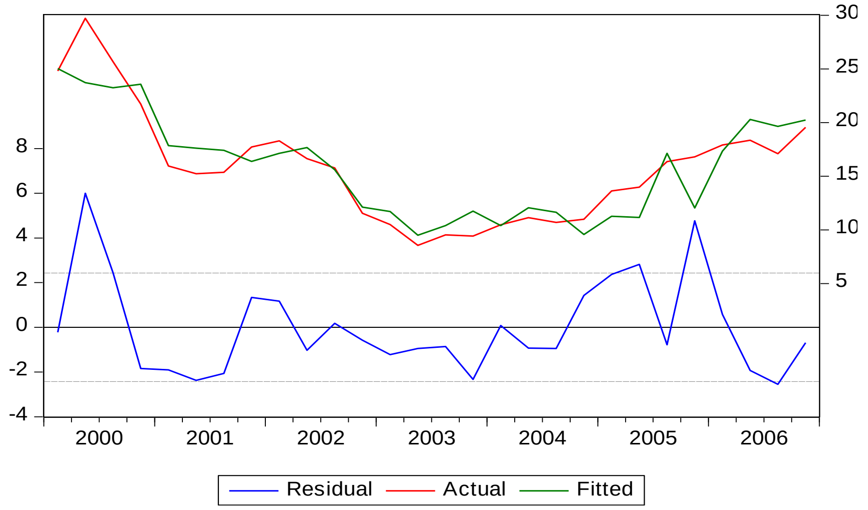
R-squared	0.831234	Mean dependent var	15.84036
Adjusted R-squared	0.783015	S.D. dependent var	5.209090
S.E. of regression	2.426478	Akaike info criterion	4.823077
Sum squared resid	123.6438	Schwarz criterion	5.156128
Log likelihood	-60.52308	Hannan-Quinn criter.	4.924894
F-statistic	17.23879	Durbin-Watson stat	1.422771
Prob(F-statistic)	0.000000		

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.180080	Prob. F(2,19)	0.3288
Obs*R-squared	3.093821	Prob. Chi-Square(2)	0.2129

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.574255	Prob. F(6,21)	0.7464
Obs*R-squared	3.946524	Prob. Chi-Square(6)	0.6839
Scaled explained SS	3.189051	Prob. Chi-Square(6)	0.7848



Koninklijke KPN NV

Dependent Variable: STOCK
Method: Least Squares
Date: 12/15/10 Time: 11:52
Sample (adjusted): 2001Q1 2006Q4
Included observations: 18 after adjustments
STOCK = C(1) + C(2)*SG + C(3)*OPM + C(4)*FCAPEX + C(5)*WCAPEX + C(6)*TAX + C(7)*WACC

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	21.04975	7.492431	2.809469	0.0170
C(2)	19.68986	12.87506	1.529302	0.1544
C(3)	1.072527	1.228530	0.873016	0.4013
C(4)	-0.472274	0.796557	-0.592895	0.5652
C(5)	-0.540310	0.728655	-0.741517	0.4739
C(6)	-56.11455	24.14609	-2.323960	0.0403
C(7)	93.05913	91.36118	1.018585	0.3303

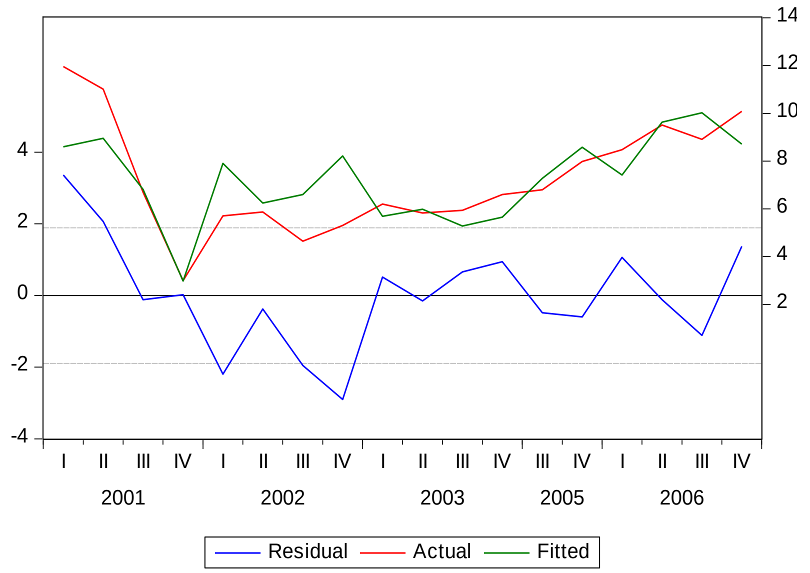
R-squared	0.577578	Mean dependent var	7.252533
Adjusted R-squared	0.347165	S.D. dependent var	2.337773
S.E. of regression	1.888878	Akaike info criterion	4.395145
Sum squared resid	39.24648	Schwarz criterion	4.741401
Log likelihood	-32.55630	Hannan-Quinn criter.	4.442889
F-statistic	2.506713	Durbin-Watson stat	1.139836
Prob(F-statistic)	0.088641		

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.831379	Prob. F(2,9)	0.4663
Obs*R-squared	2.806934	Prob. Chi-Square(2)	0.2457

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.663228	Prob. F(6,11)	0.0757
Obs*R-squared	10.66106	Prob. Chi-Square(6)	0.0994
Scaled explained SS	4.114523	Prob. Chi-Square(6)	0.6612



Portugal Telekom SGPS SA

Dependent Variable: STOCK
Method: Least Squares
Date: 12/15/10 Time: 11:53
Sample (adjusted): 2002Q1 2006Q4
Included observations: 16 after adjustments
STOCK = C(1) + C(2)*SG + C(3)*OPM + C(4)*FCAPEX + C(5)*WCAPEX + C(6)*TAX + C(7)*WACC

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	14.38431	2.055107	6.999300	0.0001
C(2)	-1.535002	2.092309	-0.733640	0.4818
C(3)	-9.600024	4.773287	-2.011198	0.0752
C(4)	0.457123	0.512670	0.891652	0.3958
C(5)	-0.225789	0.325953	-0.692704	0.5060
C(6)	-42.27211	8.116083	-5.208437	0.0006
C(7)	192.8898	62.62059	3.080293	0.0131

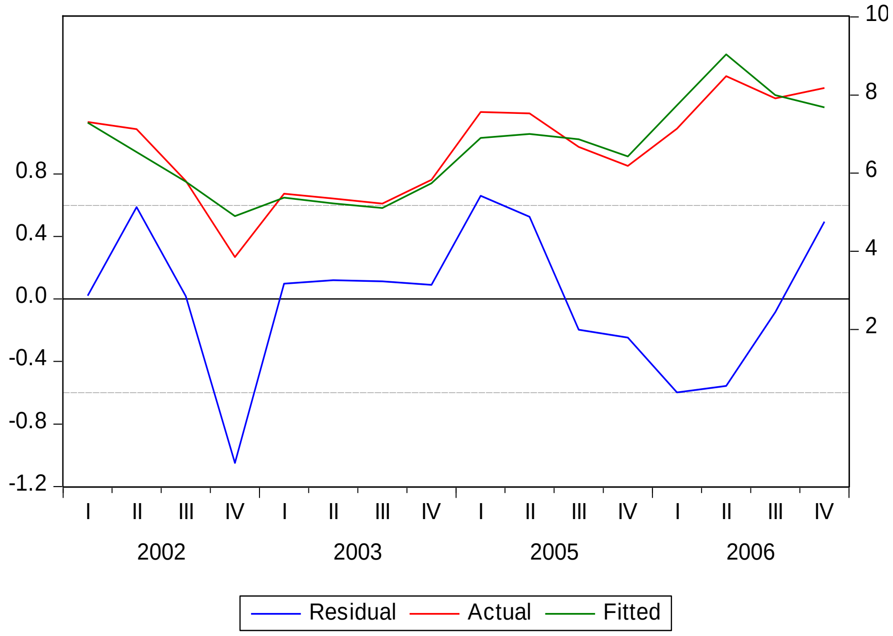
R-squared	0.867308	Mean dependent var	6.601525
Adjusted R-squared	0.778847	S.D. dependent var	1.273293
S.E. of regression	0.598791	Akaike info criterion	2.111827
Sum squared resid	3.226954	Schwarz criterion	2.449835
Log likelihood	-9.894617	Hannan-Quinn criter.	2.129136
F-statistic	9.804370	Durbin-Watson stat	1.432424
Prob(F-statistic)	0.001605		

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.072386	Prob. F(2,7)	0.3924
Obs*R-squared	3.752565	Prob. Chi-Square(2)	0.1532

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.876746	Prob. F(6,9)	0.5475
Obs*R-squared	5.902162	Prob. Chi-Square(6)	0.4342
Scaled explained SS	1.780080	Prob. Chi-Square(6)	0.9388



Swisscom AG

Dependent Variable: STOCK
Method: Least Squares
Date: 12/15/10 Time: 11:53
Sample (adjusted): 2000Q2 2006Q4
Included observations: 27 after adjustments
STOCK = C(1) + C(2)*SG + C(3)*OPM + C(4)*FCAPEX + C(5)*WCAPEX + C(6)*TAX + C(7)*WACC

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-259.2751	132.9980	-1.949466	0.0654
C(2)	35.59470	43.27795	0.822467	0.4205
C(3)	133.2299	106.8646	1.246717	0.2269
C(4)	37.63470	27.36174	1.375450	0.1842
C(5)	-30.10797	27.51416	-1.094272	0.2868
C(6)	611.6021	532.6988	1.148120	0.2645
C(7)	7146.362	1529.496	4.672365	0.0001

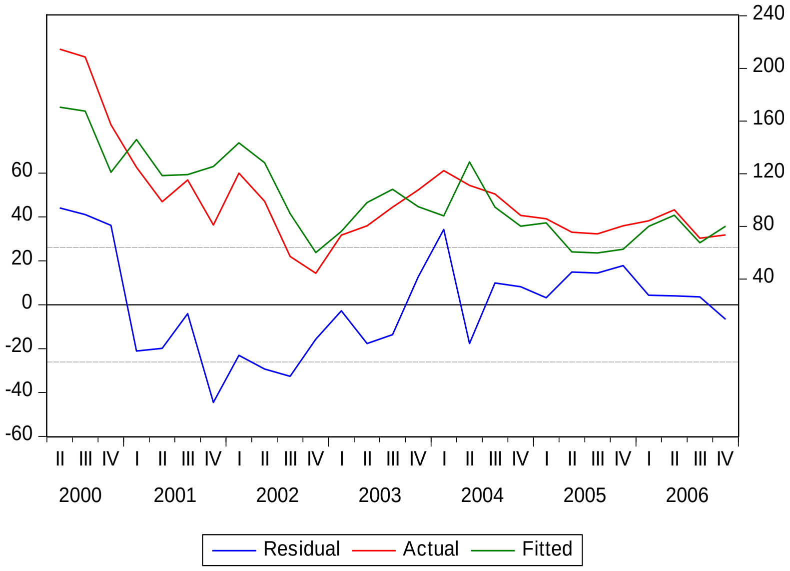
R-squared	0.661809	Mean dependent var	101.5293
Adjusted R-squared	0.560351	S.D. dependent var	39.39832
S.E. of regression	26.12346	Akaike info criterion	9.581959
Sum squared resid	13648.70	Schwarz criterion	9.917916
Log likelihood	-122.3564	Hannan-Quinn criter.	9.681856
F-statistic	6.523018	Durbin-Watson stat	0.840628
Prob(F-statistic)	0.000621		

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	5.405783	Prob. F(2,18)	0.0145
Obs*R-squared	10.13177	Prob. Chi-Square(2)	0.0063

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	4.657527	Prob. F(6,20)	0.0041
Obs*R-squared	15.73713	Prob. Chi-Square(6)	0.0152
Scaled explained SS	6.115690	Prob. Chi-Square(6)	0.4104



Tele2 AB

Dependent Variable: STOCK
Method: Least Squares
Date: 12/15/10 Time: 12:22
Sample (adjusted): 2001Q1 2006Q4
Included observations: 21 after adjustments
STOCK = C(1) + C(2)*SG + C(3)*OPM + C(4)*FCAPEX + C(5)*WCAPEX + C(7)*WACC

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	38.11687	6.180421	6.167358	0.0000
C(2)	-0.034307	10.55836	-0.003249	0.9975
C(3)	13.76389	8.503729	1.618571	0.1264
C(4)	-2.729224	4.080917	-0.668777	0.5138
C(5)	-2.577192	4.235780	-0.608434	0.5520
C(7)	-547.8858	123.7027	-4.429052	0.0005

R-squared	0.755053	Mean dependent var	11.53190
Adjusted R-squared	0.673404	S.D. dependent var	4.806031
S.E. of regression	2.746580	Akaike info criterion	5.093547
Sum squared resid	113.1556	Schwarz criterion	5.391982
Log likelihood	-47.48224	Hannan-Quinn criter.	5.158315
F-statistic	9.247530	Durbin-Watson stat	0.685950
Prob(F-statistic)	0.000354		

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	6.214143	Prob. F(2,13)	0.0128
Obs*R-squared	10.26392	Prob. Chi-Square(2)	0.0059

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.519966	Prob. F(5,15)	0.2423
Obs*R-squared	7.061842	Prob. Chi-Square(5)	0.2161
Scaled explained SS	2.810346	Prob. Chi-Square(5)	0.7292

Telefonica S.A.

Dependent Variable: STOCK
Method: Least Squares
Date: 12/15/10 Time: 11:53
Sample (adjusted): 2000Q2 2006Q4
Included observations: 27 after adjustments
STOCK = C(1) + C(2)*SG + C(3)*OPM + C(4)*FCAPEX + C(5)*WCAPEX + C(7)*WACC

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	16.54657	13.33491	1.240846	0.2283
C(2)	3.759827	10.90659	0.344730	0.7337
C(3)	-28.79770	12.86947	-2.237676	0.0362
C(4)	4.937315	1.238678	3.985955	0.0007
C(5)	0.654907	1.578991	0.414763	0.6825
C(7)	55.25327	278.9381	0.198084	0.8449

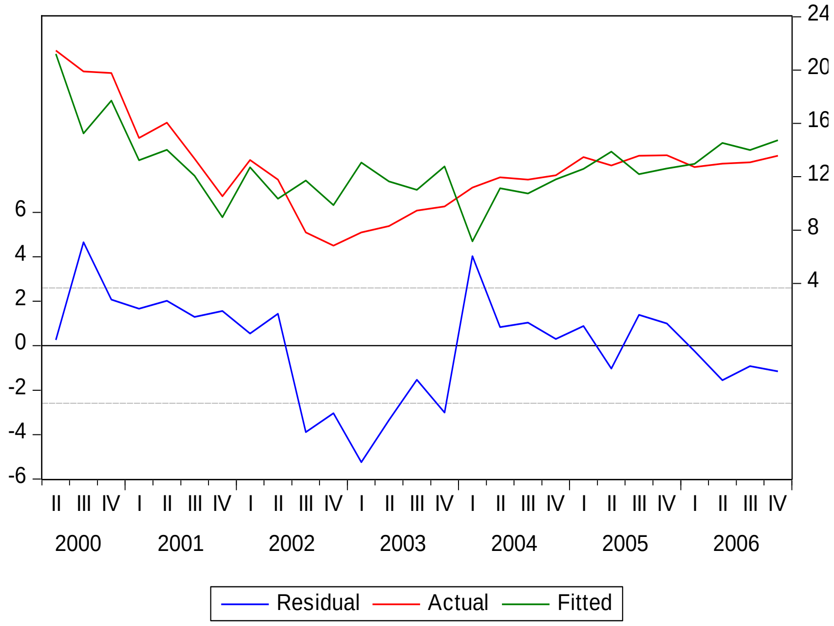
R-squared	0.570256	Mean dependent var	12.73967
Adjusted R-squared	0.467936	S.D. dependent var	3.556356
S.E. of regression	2.594104	Akaike info criterion	4.937489
Sum squared resid	141.3168	Schwarz criterion	5.225453
Log likelihood	-60.65610	Hannan-Quinn criter.	5.023116
F-statistic	5.573253	Durbin-Watson stat	1.030303
Prob(F-statistic)	0.002022		

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	4.355433	Prob. F(2,19)	0.0277
Obs*R-squared	8.487406	Prob. Chi-Square(2)	0.0144

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.602164	Prob. F(5,21)	0.2030
Obs*R-squared	7.455567	Prob. Chi-Square(5)	0.1889
Scaled explained SS	4.104556	Prob. Chi-Square(5)	0.5345



Telekom Austria AG

Dependent Variable: STOCK
Method: Least Squares
Date: 12/15/10 Time: 16:48
Sample (adjusted): 2000Q2 2006Q4
Included observations: 19 after adjustments
STOCK = C(1) + C(2)*SG + C(3)*OPM + C(4)*FCAPEX + C(5)*WCAPEX + C(6)*TAX + C(7)*WACC

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-37.09209	16.66529	-2.225710	0.0460
C(2)	-15.56299	4.235689	-3.674254	0.0032
C(3)	6.303055	15.36594	0.410197	0.6889
C(4)	37.28697	6.644384	5.611801	0.0001
C(5)	-3.872276	3.879648	-0.998100	0.3379
C(6)	-75.90655	24.82238	-3.057988	0.0099
C(7)	2193.779	304.7848	7.197796	0.0000

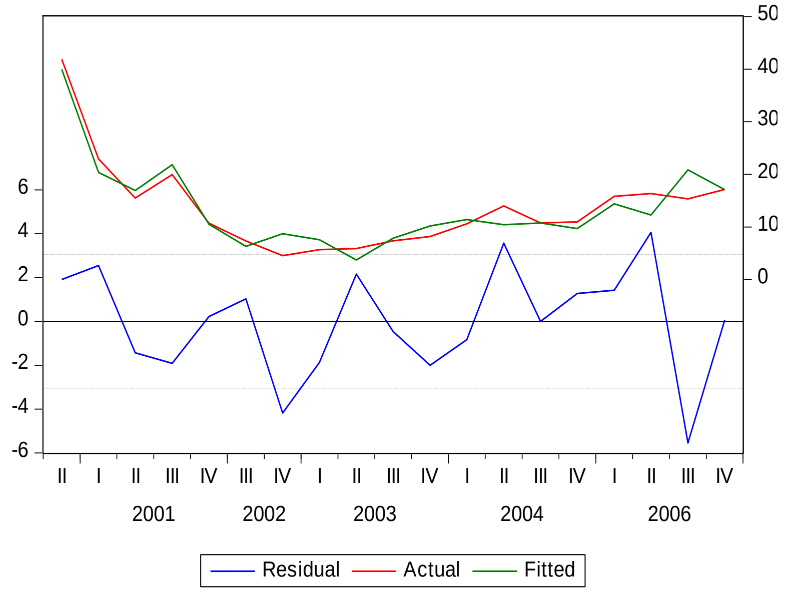
R-squared	0.914726	Mean dependent var	13.75105
Adjusted R-squared	0.872089	S.D. dependent var	8.503378
S.E. of regression	3.041202	Akaike info criterion	5.339692
Sum squared resid	110.9869	Schwarz criterion	5.687643
Log likelihood	-43.72708	Hannan-Quinn criter.	5.398579
F-statistic	21.45383	Durbin-Watson stat	2.610478
Prob(F-statistic)	0.000009		

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.533752	Prob. F(2,10)	0.2624
Obs*R-squared	4.460115	Prob. Chi-Square(2)	0.1075

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.711092	Prob. F(6,12)	0.6477
Obs*R-squared	4.983509	Prob. Chi-Square(6)	0.5459
Scaled explained SS	1.782697	Prob. Chi-Square(6)	0.9386



Telenor ASA

Dependent Variable: STOCK
Method: Least Squares
Date: 12/15/10 Time: 16:32
Sample (adjusted): 2001Q3 2006Q4
Included observations: 20 after adjustments
STOCK = C(1) + C(2)*SG + C(3)*OPM + C(4)*FCAPEX + C(5)*WCAPEX + C(7)*WACC

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	9.545421	2.448739	3.898096	0.0016
C(2)	5.942711	8.398891	0.707559	0.4908
C(3)	1.315076	6.640282	0.198045	0.8459
C(4)	1.485965	2.792484	0.532130	0.6030
C(5)	-0.765973	1.636315	-0.468109	0.6469
C(7)	-104.1013	47.33907	-2.199057	0.0452

R-squared	0.402909	Mean dependent var	5.616500
Adjusted R-squared	0.189662	S.D. dependent var	2.163981
S.E. of regression	1.947990	Akaike info criterion	4.414798
Sum squared resid	53.12529	Schwarz criterion	4.713517
Log likelihood	-38.14798	Hannan-Quinn criter.	4.473111
F-statistic	1.889399	Durbin-Watson stat	0.370557
Prob(F-statistic)	0.160087		

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	4.318539	Prob. F(2,14)	0.0346
Obs*R-squared	8.394003	Prob. Chi-Square(2)	0.0150

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.442213	Prob. F(5,16)	0.8126
Obs*R-squared	2.671091	Prob. Chi-Square(5)	0.7505
Scaled explained SS	0.779817	Prob. Chi-Square(5)	0.9783